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SOME ASPECTS OF MORPHOMETRIC RELATIONSHIP AND FOOD AND FEEDING IN *CARANX CARANGUS* (BLOCH) FROM TUTICORIN WATERS (GULF OF MANNAR)

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ABSTRACT

The paired comparisons of morphometric characters of *Caranx carangus* reveal that all the four variables; fork length, body depth, eye diameter and wet weight have a very high significant relationship with total length. Regression equations are given for the four pairs of comparisons, along with the correlation coefficient V and students Y .

The food and feeding study reveals that the dominant food was fish followed by crustaceans like prawns and crabs. *Stolephorus* was the dominant food and preferred well by *Caranx carangus*, followed by sardines, *Leiognathus*, *Metapenaeus* spp., *Thrissocles*, *Penaeus indicus* and *Portunus pelagicus* as indicated by the index of preponderance. Except in certain months there was a high correlation between the relative condition (K_n) and the volume of food. The young ones measuring upto 149 mm sustain themselves only on prawns and those bigger than 150 mm thrive mainly on fish, prawn and crab in that order.

INTRODUCTION

The commercial importance and the magnitude of the fishery of carangids of Tuticorin have been highlighted by Kasim and Hamsa (1988). Among different species of carangids *Caranx carangus* constituted 19% in trawl net landings and 21.1% in gill net landings. Except a detailed study on the fishery and population dynamics of this species (Kasim and Hamsa, 1988) no information is available on the biology of this species. Detailed accounts are available on the food and feeding of different species of carangids such as *Caranx kalla* (Chiddamabaram and Venkataraman, 1946; Chacko and Mathew, 1955), horse mackerel (Datar, 1954; Kuthalingam, 1955, 1959; Kagwade, 1965, 1967), *Se-*

laroides Iptolepis (Tandon, 1960), *Megalaspis cordyla* and *Decapterus dayi* (Sreenivasan, 1974, 1979). Information on the food and feeding and morphometric relationship of *Caranx carangus* is totally lacking and the present account endeavours to fulfil this lacuna.

MORPHOMETRIC RELATIONSHIP

The samples of *Caranx carangus* were collected during 1981-'82 from drift gill net (*Podivalai*) landings at Punnakayal, a nearby landing centre from Tuticorin wherein the drift gill net is operated throughout the year. The morphometric measurements such as the total length, fork length, body depth, eye diameter in mm and wet weight in g were recorded in fresh condition and subsequently

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the fish were preserved in formalin for food and feeding studies. Morphometric measurements and weight in logarithms of 73 specimens of *Caranx carangus* were subjected to regression analysis (Snedecor, 1961). The regression equations obtained from the four paired comparisons are given in the Table 1 along with the correlation coefficient V , students Y and probability values. The correlation coefficient values of all the comparisons are higher than 0.96 except the comparison between eye diameter and total length in which the V value is just higher than 0.75.

As seen from the distribution of 't', probability values and correlation coefficient V , it is clear that the biological relationship among the different morphometric characters is highly significant. The four comparisons wherein the commonly measured total length is treated as independent variable and the other factors as dependent variables, indicate that fork length, body depth, eye diameter and wet weight have a very high significant relationship with total length. The order of significance among these four comparisons is FI x TI, Wt x TI, Bd x TI and Ed x TI (Table 1).

FOOD AND FEEDING

Stomach contents of 107 specimens of *Caranx carangus* ranging from 122-240 mm in the total length were examined. The intensity of feeding was determined for each fish based on the distension of the stomachs and the amount of food contained in the stomach and was classified by eye estimation as gorged, full, 3/4 full, 1/2 full, 1/4 full, little and empty (Pillay, 1952). The total volume of the stomach content was measured by displacement method and different food items were identified and recorded.

The total volume of the stomach contents varied from 0.35 ml to 4.83 ml and the

average volume of food contents was 4.83 ml in gorged stomachs, 2.56 ml in full, 1.68 ml in 3/4 full, 1.24 ml in 1/2 full, 0.72 ml in 1/4 full and 0.35 ml in stomachs containing little quantity of food. The first four conditions from gorged to 1/2 full are considered as indicators of active feeding and the rest of the three conditions as poor feeding. From the percentage frequency of the intensity of feeding given in Table 2, it may be seen that the incidence of empty stomachs was always higher in all the months except in April. Further, it is evident from the poor feeding condition (62.9%) that *Caranx carangus* is not an active feeder during night drift time as the samples were drawn from night catches by drift gill nets. Similar poor feeding condition was reported in *Trichiurus lepturus* (Pillai, 1974) and *Chirocentrus nudus* and *C. dorab* (Luther, 1985).

The qualitative analysis of food contents given in Table 3 indicates that fishes, prawns, crabs etc. constituted the food of *C. carangus*. Among fishes, *Stolephorus* (39.4 ml) was the dominant food followed by sardines (10.4 ml), *Thripos* (7.4 ml) and *Leiognathus* spp. (6.6 ml) by volume. Partly digested unidentified fish formed 22.7 ml. *Penaeus indicus* (2.1 ml), *Metapenaeus* spp. (3.8 ml) and prawn appendages (0.4 ml) were the constituents of prawn portion of food item. *Portunus pelagicus* was the only crab available in the food which constituted 3.8 ml and the rest of the food was partially or fully digested matter (3.4 ml) which could not be identified. There appears to be very little seasonal variation in the constituents of food items of *C. carangus* (Table 3).

In addition to the per cent volume, the per cent occurrence of different food items has also been taken into account for assessing the degree of preference of different food items by estimating the 'index of preponderance' as per the method of Natarajan and

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TABLE 1. Regression equation obtained from the paired treatments of different morphometric characters of *Caranx carangus*, along with the correlation coefficient *Y*, students *T* and probability values

S.No.	Regression equation				V	V	P
1	LogFl = - 0.0530	+	0.9915	Log Tl	0.9965	106.7792	< 0.001
2	LogBd = 0.1623	+	0.8497	Log Tl	0.9641	30.7313	< 0.001
3	Log Ed = 0.7335	+	0.7816	Log Tl	0.7459	9.4330	< 0.001
4	LogWt = -5.3783	+	3.2332	Log Tl	0.9696	33.5504	< 0.001

Fl = Fork length; Tl = Total length; Bd = Body depth; Ed = Eye diameter

TABLE 2. Percentage frequency of the intensity of feeding of *Caranx carangus* caught during night catches by drift gill nets (podivalai) at Punnakayal (Gulf of Mannar)

Months	Gorged	Full	3/4full	1/2full	1/4full	Little	Empty
Jul.'81	16.7	-	16.7	33.3	-	16.7	16.7
Aug.		10.0	10.0	-	30.0	-	50.0
Sep.		-	-	-	-	14.3	85.7
Oct.	9.0	18.2	-	9.0	-	9.0	54.8
Nov.		26.1	8.7	17.4	-	8.7	39.1
Dec.	10.0	-	20.0	30.0	10.0	-	30.0
Jan.'82		-	-	-	-	40.0	60.0
Feb.		-	-	-	-	11.1	88.9
Mar.		-	20.0	-	40.0	20.0	20.0
Apr.		16.7	33.3	33.3	-	16.7	-
May	12.5	25.0	-	12.5	37.5	-	12.5
Jun.		14.3	14.3	28.6	14.3	-	28.6
Mean	4.0	9.2	10.3	13.7	11.0	11.4	40.5

TABLE 3. Food components in percentage of *Caranx carangus* from Punnakayal(Gulf of Mannar) caught in drift gill nets (Podivalai) operated during night hours

Months	Size group (TLmm)	No. of fish	Fishes				Prawns		Crabs	Partly/fully digested matter
			<i>Stolephorus</i>	<i>Thris-socles</i>	<i>Leiognathus</i>	Sardines	Partly digested fish	<i>P.indicus</i>	<i>Metapenaeus</i> spp.	<i>P.pelagicus</i>
Jul.	81200-218	6	82.9	-	14.3				2.8	
Aug.	173-204	10	47.2			24.5				18.9
Sep.	146-222	7	71.4				28.6			
Oct.	144-182	11			17.5	26.3	48.3		7.9	
Nov.	145-194	23	13.6	34.0		9.7	34.0	4.9	0.9	2.9
Dec.	161-175	10	16.7	5.0	10.1	15.2	45.4	7.6		
Jan.'82	163-234	5	79.3				14.6			6.1
Feb.	122-218	9	95.0						5.0	
Mar.	157-227	5	55.4				27.2	6.5		10.9
Apr.	174-240	6			16.7				16.6	52.8
May	165-190	8	48.4	17.2	9.6	10.8			8.6	5.4
Jun.	153-220	7	84.3				7.1		8.6	

Jhingran (1961). The index of preponderance along with per cent volume and occurrence of different food items given in Fig. 1 clearly shows that the order of preference is *Stolephorus* (index 57.5), partially digested fish (22.7), sardines (5.6), *Leiognathus* (3.5), *Metapenaeus* spp. (2.9), *Thris-socles* (2.9), partially or fully digested matter (2.4), *Penaeus indicus* (1.1), *Portunus pelagicus* (0.9) and prawn appendages (0.5) (Fig. 1).

The monthly relative condition factor is given along with the volume of food (Fig. 2). The relative condition factor increased from July to October and again increased to a couple of peaks in March and June with a couple of moderate declines in January and May. The volume of food also followed the similar trend as observed in relative condition with some variation in September, Janu-

ary, February, April, May and June. It is difficult to explain the variations observed. It could be due to the influence of some other factors other than food. Similar observations have been reported by Marichamy (1970, 1974) in *Thrissina baelatna* and *Herklotsichthys punctatus* respectively. There seems to be a major peak period of active feeding in October to December which coincides with the northeast monsoon and a minor one during May and June.

The percentage composition of different food components in different size ranges of *C. carangus* is given in Table 4. The smaller size ranges from 120-149 mm prefer crustacean food consisting exclusively of prawns, and the remnants of fish were observed in the gut only from 150 mm onwards indicating switching over to fishes as the dominant food

4A

^7 INDEX OF PREPONDERANCE
M PERCENT VOLUME
O PERCENT OCCURRENCE

i> flf

flf fliflflj

STO PDF SAR LEIO MET THRI PFD M P IND P PEL PAPP

FIG. 1. Per cent volume and per cent occurrence of different food items of *Caranx carangus* along with the index of preponderance estimated from these two factors which is a measure of preference to different food items. (STO: *Solephorus*; PDF: Partially digested fish; SAR: sardines; LEIO: *Lewgnathus*; MET: *Melapenaeus*; THRI: *Thrissocles*; PFD: partially or fully digested matter; P. IND: *Penaeus indicus*; P. PEL: *Portunus pelagicus*; PAPP: prawn appendages).

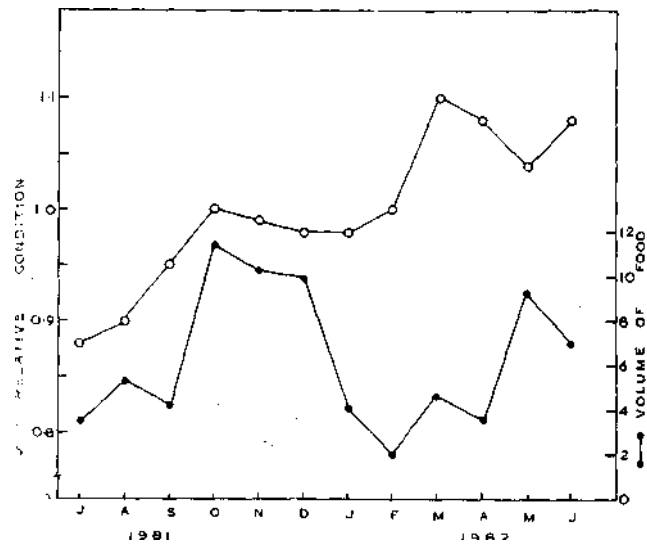


FIG. 2. Variation in the relative condition factor (Kn) and feeding intensity in *Caranx carangus* during different months in 1981-82 at Tuticorin.

TABLE 4. Percentage composition of different food components of *Caranx carangus* of different size ranges obtained from the night catches by drift gillnets (Podivalai) at Punnakayal

Size range (mm)	Fishes					Prawn		Crabs	Partly or fully digested matter
	<i>Solephorus</i>	<i>Thrissocles</i>	<i>Leiognathus</i>	Sardines	Partly digested fish	<i>P. indicus</i>	<i>Melapenaeus</i> spp.	<i>P. Pelagicus</i>	
120-129							66.7	33.3	
130-139							67.7		32.3
140-149						18.8	68.7		12.5
150-159					11.4	36.9	36.9	3.4	11.4
160-169	28.8	29.9			38.8	2.0		0.5	
170-179	29.0	6.0	1.1	28.5	22.2	1.8	2.9		1.9
180-189	72.9	4.3	15.5			1.3	4.1	0.6	1.3
190-199	28.0			9.3	42.1				11.2
200-209	59.3	7.8	3.0		16.7				13.2
210-219	17.2			20.7	34.5				27.6
220-229	46.9				37.5				15.6
230-239	25.6		35.9		25.7				12.8
240-249				21.7	65.2				13.1

items in the higher size ranges. In addition to fishes, crabs belonging to *Portunus pelagicus* were also observed in the stomachs of high size range fishes. This change in the type of food is attributed to the size of the oral opening and the ability of the predator to stalk its prey.

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